

Rosaceae—Rose family

Peraphyllum ramosissimum Nutt.

squaw-apple

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Growth habit and occurrence. Squaw-apple—*Peraphyllum ramosissimum* Nutt.— the sole member of its genus, is an intricately and rigidly branched deciduous shrub growing to 2 m tall from numerous, gray-barked basal stems. Leaves are simple, linear-oblongate, entire or minutely serrulate, and alternate but fascicled on secondary growth at the ends of short lateral spurs. Squaw-apple occurs mainly in well-drained soils on dry foothill and mountain slopes and is associated with several community types, including oak–sagebrush, mountain brush, pinyon–juniper, and the lower edges of ponderosa pine forests (Hitchcock 1961; Shaw and Monsen in press; Welsh and others 1987). On a microhabitat scale, squaw-apple often grows in mixed-species clumps. The overall range distribution extends from Grant and Baker Counties in north-central Oregon, south to northeastern California, and east through Nevada, southern Idaho, Utah, western Colorado and northwestern New Mexico (Harrington 1954; Hitchcock and others 1961; Welsh and others 1987). Dayton (1931) reports an altitudinal distribution of 915 m in Oregon to 2,740 m towards the southern range limit.

Uses. Wildlife known to eat squaw-apple fruits and seeds or both in Utah include grouse and wild turkeys (family Phasianidae), deer mice (*Peromyscus maniculatus*), chipmunks (*Eutamias* spp.), ground squirrels (*Spermophilus* spp.), and American black bears (*Ursus americanus*) (Auger and others 1995). Deer (*Odocoileus* spp.) browse squaw-apple lightly during the fall and winter (Shaw and Monsen in press; Smith 1974), and small birds use the intricately branched shrubs as cover even when leaves are not present (Shaw and Monsen in press). Livestock also browse squaw-apple, and opinions vary widely on its forage value. In central Utah, squaw-apple is said to be almost worthless; in western Colorado, it is considered poor to fair; in eastern Oregon and northeastern California, it is commonly considered fair to moderately good sheep and cattle browse in the spring; and finally, in southwestern Utah, squaw-apple ranks as a valuable browse (Dayton 1931; Plummer and others 1968; Smith 1974). On ranges grazed by cattle during late winter and very early spring, individual plants may be severely hedged (Smith 1974). Even though squaw-apple grows slowly, Monsen and Davies (1985) suggest that it can persist in native plant landscaping for arid environments.

Flowering and fruiting. The regular, perfect flowers with their pinkish, spreading, showy petals open in May and June and appear singly or in clusters of 2 to 5. Data from Utah suggest that flowering intensity is greatest for individual plants larger than 1 m in both height and crown (Auger and others 1995). Squaw-apple is pollinated by a variety of insects, and seed

production does not appear to be pollen-limited (Auger and others 1995). The fruits, which ripen from late June to early August, are a yellowish red, bitter-tasting pome measuring 8 to 18 mm in diameter, each containing 1 to 8 plump seeds (figure 1). Seeds consist of a brown, leathery testa entirely filled with embryo (figure 2). At 1,070 m in northeastern Oregon, most of the fruits have either dropped or been partially eaten by birds by mid-August (Smith 1974). At 2,500 m in east-central Utah, initiation of fruit removal precedes ripening, and again, most fruits usually have been consumed by mid-August (Auger and others 1995).

Collection, extraction, and storage. Ripe fruits are easily picked from the shrubs. Seeds can be extracted by mashing the fruits in water and floating off the pulp. Any remaining debris may be removed using a fanning mill after the seeds are dry. Seeds stored in a dry, cool, ventilated metal container remained viable up to 5 years (Plummer and others 1968). The yield of pure seeds from 45.5 kg (100 lb) of fresh fruits ranges from 3.0 to 4.7 kg (6.5 to 10.3 lb), and the number of pure seeds per weight ranges from 52,360/kg (23,750/lb) (Plummer and others 1968) to 110,870 (50,290/lb) (Auger and others 1995; Smith 1974). When individual fruits were examined from 2 squaw-apple stands in Utah, filled seed averaged 71 and 58% (Auger and others 1995); another lot yielded a seed fill value of 68% (Smith 1974).

Germination. Germination of squaw-apple seeds is epigeal (figure 3) and may occur during cold stratification both in the laboratory and the field. For 1 seedlot, the percentage viability of filled seeds (tetrazolium method) was 79.8% (Auger 1994). Dormancy is embryo-induced. Embryos excised from unstratified seeds and placed on blotters did not germinate when incubated at 10/20 EC (12/12 hours, day/night). Excised embryos required 49 days—the same as intact seeds—before beginning to germinate during cold stratification (Auger 2002). Tests at the USDA Forest Service's Eastern Tree Seed Laboratory (now the National Tree Seed Laboratory) (Smith 1974) indicated that stratification of seeds in a plastic bag for about 45 days at 3 EC maximizes total germination while minimizing germination occurring during stratification.

For a seedlot collected at 2,500 m, viable seeds treated to 70 days of stratification at 1 EC followed by incubation at 10/20 EC (12/12 hours, day/night), showed 79% total germination (Auger 1994). This represented a 71% difference in value for seeds stratified only 35 days. Viable seeds from the same lot kept in low-temperature stratification (1 EC) showed 50% germination by day 82 and about 95% by day 120. Results from seeds collected the next year (1995) were similar. Smith (1974) reported somewhat lower germination percentages at longer chill durations. When seeds were tested at 30/20 EC (8/16 hours, day/night) after 0, 30, 60, and 90 days of cold stratification, germination of squaw-apple averaged 9, 9, 16, and 51% of total seeds.

Nursery practice. Squaw-apple is grown in nursery beds only occasionally, usually when requested for transplantation at age 1 to 2 years into native-plant gardens (Prag and Prag 1996). In the greenhouse, squaw-apple seedlings emerge in 6 to 12 days from seeds planted about 5 mm (0.19 in) deep and covered with a thin layer of fine sand (Smith 1974). Overwatering and transplantation during the growing season increase the risk of seedling mortality (Prag and Prag 1996). Establishment is rated fair and persistence is very good (Plummer and others 1968; Shaw and Monsen in press).

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Figure 1—*Peraphyllum ramosissimum*, squaw-apple: seed, H4.

Figure 2—*Peraphyllum ramosissimum*, squaw-apple: longitudinal sections through a seed, H8.

Figure 3—*Peraphyllum ramosissimum*, squaw-apple: seed, H4.